

Empyema Caused by *Eikenella Corrodens*

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ABSTRACT

Eikenella corrodens is a fastidious, facultative anaerobic, non-motile, gram-negative bacilli that is part of the normal flora of the mouth and upper respiratory tract. It is being increasingly recognized as a human pathogen and has been implicated in a variety of human infections, including, periodontitis, brain abscess, endocarditis, osteomyelitis, intra-abdominal infections, and pleuropulmonary infections. We report, for the first time, from the Himalayan Kingdom of Nepal, a case of left-sided empyema due to *Eikenella corrodens*, in an 83-year-old man. *Eikenella corrodens* was isolated as a pure growth from the pleural aspirate, proving its pathogenic potential. Surgical drainage and an appropriate antimicrobial therapy resulted in a therapeutic response. We have discussed the difficulties that can be encountered in isolating *Eikenella corrodens* and in choosing appropriate antibiotics for its treatment.

Key words: *Eikenella corrodens*, Empyema, Isolation, Treatment

INTRODUCTION

Eikenella corrodens is a fastidious, facultative anaerobic, non-motile, gram-negative bacilli that is part of the normal flora of the mouth and upper respiratory tract.^[1] It is being increasingly recognized as a human pathogen. It has been isolated in pure culture thus removing doubts about its potential to cause disease.^[2] It has been implicated in a variety of human infections, including, periodontitis, brain abscess, endocarditis, osteomyelitis, intra-abdominal infections, and pleuropulmonary infections.^[1] Pleuropulmonary infections with *Eikenella corrodens* most often occur in patients with compromised local defense mechanisms such as increased propensity for aspiration, presence of underlying lung diseases, and immunosuppression.^[1]

We report, for the first time, from the Himalayan Kingdom of Nepal, a case of left-sided empyema due to *Eikenella corrodens*, in an elderly man. We have discussed the difficulties that can be encountered in isolating *Eikenella corrodens* and in choosing appropriate antibiotics for the treatment of infections by this pathogen.

CASE REPORT

An 83-year-old man presented with high-grade fever, dry cough, and exertional dyspnea, of seven days' duration. He was not diabetic or hypertensive. There was no past history of tuberculosis. On examination he was febrile (38.6°C), with a pulse of 86/minute and respiratory rate of 38/minute. The oral cavity was normal and there was no evidence of infection. There was decreased chest movement and air entry on the left side of the thorax.

His hemoglobin was 12.6 g/dl, erythrocyte sedimentation rate (ESR) was 42 mm/hour, and total leukocyte count was 16,500/mm³, with 80% neutrophils, 10% lymphocytes, and 8% monocytes. His random blood sugar was 94 mg/dl.

His chest X-ray revealed a massive left-sided hydrothorax. There was no evidence of hilar or mediastinal adenopathy. Intercostal drainage was performed and approximately 800 ml of pus was drained. The gram stain of the aspirate revealed plenty of polymorphonuclear leukocytes, but no bacteria were visualized. Ziehl Neelsen staining of the aspirate did not reveal any acid fast bacilli. KOH examination was negative for fungal elements. The aspirate was inoculated on sheep blood agar, chocolate agar, and MacConkey agar and incubated at 35°C in a

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candle extinction jar and also under anerobic conditions. Empirically treatment was started with amikacin, metronidazole, and vancomycin. However, there was no remission of fever.

After 48 hours of incubation in a candle jar with about five to ten percent carbon dioxide, the culture on blood agar and chocolate agar showed two types of colony morphologies. Some of the colonies were small and pitting, while the others were larger, translucent, and non-pitting. The colonies had a pale yellow pigment and the characteristic odor of hypochlorite bleach. Gram staining of the colonies showed gram-negative coccobacilli [Figure 1]. Both the colonies were oxidase positive and catalase negative. They reduced nitrate to nitrite and were lysine and ornithine decarboxylase positive. The carbohydrates were not utilized oxidatively or fermentatively. Indole and urease were not produced. The isolate was identified as *Eikenella corrodens* on the basis of the colony morphology, typical biochemical reactions, and characteristic odor. Kirby Bauer disk diffusion tests were performed for determining the antibiotic susceptibility of the isolate. However, as there were no standard clinical laboratory standards institute (CLSI) guidelines for interpretation of the disk diffusion test for this organism, the antibiogram was read visually and large zones of inhibition were observed with penicillin and amoxicillin, while only very narrow zones were noted with oxacillin and clindamycin. Agar dilution and broth dilution tests recommended by CLSI for determining the antibiotic susceptibility were not performed as this study was done in a resource limited setting. Mycobacterial and fungal cultures of the pleural fluid were negative. Paired blood samples from the patient were collected in brain–heart infusion (BHI) biphasic medium and incubated at 37°C. They were sub-cultured on blood agar and chocolate agar after 24 hours, 48 hours, one week, and two weeks of incubation. The blood agar and chocolate agar plates were incubated in a candle jar with about five to ten percent CO₂. However, all the cultures were negative. Since the oral cavity was normal, with no evidence suggestive of infection, the patient was not further investigated for dental and periodontal infections by *Eikenella corrodens*.

The patient was diagnosed to have empyema caused by *Eikenella corrodens* and was therefore treated with amoxicillin-clavulanic acid for two weeks. As a majority of the patients with *Eikenella corrodens*, were known to have co-existing anerobic infection, metronidazole was also administered empirically. The patient improved clinically with remission of fever and the follow-up chest radiograph performed after eight weeks showed complete resolution of the empyema.

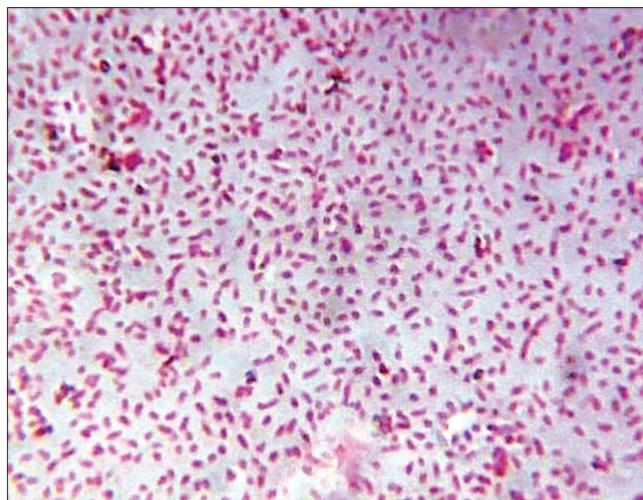


Figure 1: Gram-staining of the culture showing gram-negative coccobacilli

DISCUSSION

Eikenella corrodens is a relatively rare cause of pulmonary infections. Pulmonary infections by this organism occur either alone or in combination with other common respiratory pathogens.^[3] *Eikenella corrodens* usually cause pulmonary infections in those with various predisposing factors such as aspiration, alcoholism, immunosuppression, cardiovascular diseases, and diabetes mellitus.^[3] In our case there was no such underlying condition. Pulmonary complications due to infection by *Eikenella corrodens* include parapneumonic effusion, empyema, and chest wall infiltration.^[3,4] Our patient developed empyema as a complication. Besides pulmonary infections, *Eikenella corrodens* has been commonly reported to cause infective endocarditis, periodontitis, osteomyelitis, and intra-abdominal infections.^[1] There are also rare reports of infective discitis and urinary tract infection caused by *Eikenella corrodens*.^[5,6]

Eikenella corrodens may often be disregarded in Gram staining.^[7] Even in a culture it may be missed, due to its slow growth in the absence of CO₂ supplementation, or misidentified due to its morphological resemblance to other organisms such as *Haemophilus* spp.^[1] As observed in our case, two morphotypes of *Eikenella corrodens* can be seen in the culture medium. The piliated variants of *Eikenella corrodens* form small, pitting colonies, while the non-piliated variants form larger, non-pitting colonies, which are often misinterpreted as a mixed growth, further confounding the diagnosis.^[1] A posttranslational event, possibly involving an alteration in pilin export and assembly, has been suggested, to mediate phase variation, which is responsible for the irreversible transition from piliated to nonpiliated variants.^[8]

Although most strains of *Eikenella corrodens* are susceptible to ampicillin, amoxicillin, and tetracyclines, they are resistant to the penicillinase-resistant penicillins, clindamycin, erythromycin, metronidazole, aminoglycosides, and vancomycin.^[1,9] Therefore, treatment failure is common when the empirical therapy is started with one of these agents. Even in our patient the initial empirical therapy was not adequate and the patient responded only after administration of the appropriate antibiotics. In addition, some occasional strains may also produce beta-lactamase, complicating the treatment.^[10] Besides appropriate antibiotic therapy, surgical drainage of pus is also equally important in the management of *Eikenella corrodens* infections. In a diabetic patient with vulvar abscess, there was initially no response to amoxicillin-clavulanic acid, however, the patient showed dramatic response following drainage of the abscess.^[11]

CONCLUSION

In conclusion, to the best of our knowledge, this is the first report of *Eikenella corrodens* from the Himalayan Kingdom of Nepal. *Eikenella corrodens* is a rare but important pathogen causing empyema. Early detection, surgical drainage of pus, and appropriate antibiotic therapy are necessary for the successful management of this infection.

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